Cost-effectiveness and efficiency of shockwave lithotripsy vs flexible ureteroscopic holmium:yttrium-aluminium-garnet laser lithotripsy in the treatment of lower pole renal calculi

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
This study assessed the cost-effectiveness of extracorporeal shock wave lithotripsy (ESWL) versus intracorporeal flexible ureteroscopy and laser lithotripsy for lower pole renal calculi of 20mm or less. The authors concluded that ESWL was clinically effective and cost-effective. Flexible ureteroscopy was not significantly better and was more expensive. The methods had some drawbacks, mainly due to the retrospective design of the clinical study and no assessment of uncertainty. These issues might affect the validity of the authors' conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study assessed the cost-effectiveness of extracorporeal shock wave lithotripsy (ESWL) versus intracorporeal flexible ureteroscopy and laser lithotripsy for lower pole renal calculi of 20mm or less.

Interventions
The two procedures were ESWL and flexible ureteroscopy for the management of renal calculi measuring 20mm or less.

Flexible ureteroscopy in combination with a 10 or 12 French gauge access sheath and 2.5 to 8 Watt holmium:yttrium-aluminium-garnet laser lithotripsy via a 272 micrometre quartz fibre, was performed under general anaesthesia.

ESWL was performed in an out-patient clinic and patients received no sedation and no anaesthesia, but analgesia was given according to their pain tolerance. A maximum of 3,000 shocks were delivered at a rate of 70 to 100 shocks per minute, and an intensity of 60 to 70%, depending upon the patient's comfort.

Location/setting
UK/hospital.

Methods
Analytical approach:
The analysis was based on one study, with a one-month time horizon. The authors stated that it was carried out from the perspective of a UK NHS hospital.

Effectiveness data:
The clinical data were from a retrospective cohort study of 89 patients, that was carried out at a teaching hospital. The analysis included 37 patients (mean age 56.6 years, SD 15.9; 22 men) who received flexible ureteroscopy and 51 patients (mean age 51.2 years, SD 14.9; 35 men) who received ESWL. The follow-up was one month from the procedure. The primary endpoint was the rate of clinical success, which was defined as having no stones or only insignificant residual fragments of less than 3mm that did not cause symptoms.

Monetary benefit and utility valuations:
Not considered.
Measure of benefit:
The clinical success rate was the primary outcome.

Cost data:
The analysis calculated two types of costs: perceived and actual. The perceived cost included the resources for the two procedures, which were the lithotripter machine or flexible ureteroscope, their maintenance and repair, medical and nursing staff, administration overheads, and pharmaceutical and utility costs. The actual cost was defined as the perceived cost plus additional procedures, hospital stay, administration, pharmaceutical, radiological, anaesthesia, medical, and nursing costs. The resource quantities were from the patients included in the clinical study. The unit costs were from the speciality costing department of the hospital. All costs were in UK pounds sterling (£).

Analysis of uncertainty:
Not considered.

Results
The success rate after the first treatment was 64.8% with flexible ureteroscopy and 74.5% with ESWL. This difference was not statistically significant. The success rate after final treatment was 100% with either treatment. The percentage of patients who were stone free was 64.9 with flexible ureteroscopy and 58.8 with ESWL; the re-treatment rate was 16.2% with flexible ureteroscopy versus 21.6% with ESWL. These differences were not significant.

An efficiency quotient was calculated to identify the most effective strategy, and this was slightly higher for flexible ureteroscopy than for ESWL.

The mean perceived cost was £249 with flexible ureteroscopy and £292 with ESWL (not significant). The mean actual cost was £2,602 with flexible ureteroscopy and £426 with ESWL (p=0.000). This was due to a significantly longer hospital stay for flexible ureteroscopy patients (2.8 days versus 0.25 days with ESWL); mainly a result of a postoperative septic complication.

Authors’ conclusions
The authors concluded that ESWL was clinically effective and cost-effective. Flexible ureteroscopy was not significantly better and was more expensive.

CRD commentary
Interventions:
The selection of the interventions was appropriate. A detailed description of the two procedures was provided.

Effectiveness/benefits:
The clinical evidence was from a cohort study, which was retrospective and open to bias. The clinical and demographic features of the two groups of patients were comparable at baseline. Power calculations to justify the sample size were not reported, and it is not clear if the study had sufficient power to capture any statistically significant differences between the groups. The inclusion and exclusion criteria were reported. All the evidence came from one institution, which might not be representative of other health care centres. A number of clinical endpoints were considered to assess the impact of the interventions on the patients’ health, but all of them were intermediate outcomes and a summary benefit measure was not derived.

Costs:
The economic analysis was consistent with the perspective stated. Two sets of costs were considered and the categories included in each set were clearly stated. The unit costs and resource quantities were not reported separately and the price year was not stated, reducing the transparency of the analysis. Conventional tests were carried out to investigate the statistical significance of the cost differences. All the economic data were from one teaching hospital. The impact of variations in the cost estimates was not assessed.

Analysis and results:
The results were clearly reported. The costs and benefits were not combined in an incremental ratio and a cost-consequences analysis was performed. The uncertainty was not investigated. The study analysed the specific clinical and
economic setting of a NHS teaching hospital and the authors stated that their results could not be transferred to other settings, given wide geographical differences. They acknowledged other limitations of their analysis, which mainly related to the design of the clinical study, but they reported that similar clinical results were found by a published trial.

Concluding remarks:
The methods had some drawbacks, mainly due to the retrospective design of the clinical study and the lack of an uncertainty analysis. These issues might affect the validity of the authors’ conclusions.

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